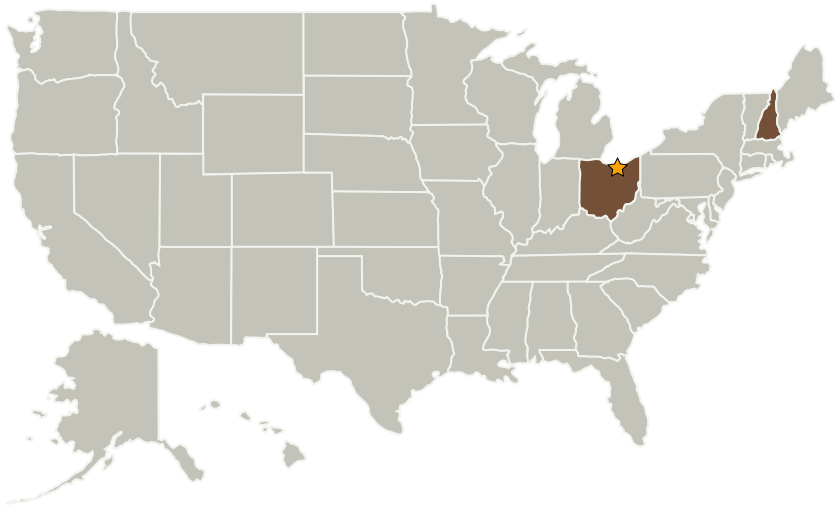
A Novel, Ultra-Light, Heat Rejection System for Nuclear Power Generation, Phase I

Completed Technology Project (2007 - 2007)

Project Introduction

For lunar-based fission power systems that will support In-Situ Resource Utilization (ISRU) or Mars robotic and manned missions, power requirements may vary from 10s to 100s of kWe to support initial human missions and longer term lunar bases. Due to the large amounts of waste heat generated by these systems, a key consideration is the development of lightweight, highly efficient heat rejection systems (HRS) that can operate at elevated temperatures (~550 K). Currently, an approach that is being strongly considered is the use of titanium sheathed heat pipe with a carbon composite over-wrap, combined with a carbon composite radiator panel to decrease the system mass. Our innovation is the integration of an ultra-light radiator panel material with a lightweight titanium heat pipe. Our calculations show that our approach will reduce the total mass by as much as 20% compared to the carbon-composite systems under consideration and represents a lower risk approach to achieve a practical HRS.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Glenn Research Center(GRC)	Lead Organization	NASA Center	Cleveland, Ohio
Creare LLC	Supporting Organization	Industry	Hanover, New Hampshire

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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Glenn Research Center (GRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Primary U.S. Work Locations	
New Hampshire	Ohio

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX14 Thermal Management Systems
  - TX14.2 Thermal Control Components and Systems
    - TX14.2.3 Heat Rejection and Storage